

**To:** Laidlaw, Tina[Laidlaw.Tina@epa.gov]  
**From:** Blend, Jeff  
**Sent:** Mon 12/23/2013 4:52:41 PM  
**Subject:** RE: RO question

In the Public analysis for EPA, we used the costs from the WERF study for WERF Level 5 which seems to just include reverse osmosis and not disposal. Then, the following modification was made:

p. 12

To meet the MT criteria, which are more stringent for TN than WERF level 5, one could assume that the highest level of treatment was needed for 100 percent of the flow--not half as specified in the cost analysis in the WERF study. Thus, cost estimates could be based on providing RO treatment to 100 percent of flow rather than 50% of flow, in order for WWTPs to achieve the Montana nutrient criteria. While it may be possible that some facilities' waste streams and effluent levels would not require 100 percent RO treatment, simulating at 50 and 100 percent provides an upper bounds estimate of the potential economic impact of the Montana nutrient criteria.

The WERF data were adapted to estimate the cost of treating all flow by RO by isolating the marginal unit processes used for Level 4 and Level 5 and calculating the cost for a treatment train with 100 percent RO.

We then said in the Widespread analysis: "Reverse osmosis generates brine that must be disposed of properly and results in significantly higher greenhouse gas emissions."

Then, on page 36, it says:

To get to RO, a membrane Replacement Cost is added which is estimated at \$24,000 /yr/1 MGD. Brine disposal costs are included within the WERF numbers.

So, perhaps disposal costs are included within the WERF study numbers.

Jeff

**From:** Laidlaw, Tina [mailto:Laidlaw.Tina@epa.gov]  
**Sent:** Friday, December 20, 2013 2:57 PM  
**To:** Blend, Jeff  
**Subject:** FW: RO question

Jeff,

Do you remember how you guys handled this cost in your economic analysis for nutrients?

Tina

**From:** Pfeifer, David  
**Sent:** Wednesday, December 18, 2013 2:37 PM  
**To:** Laidlaw, Tina  
**Subject:** RO question

I may have asked you this already at some point in the past, if so, please bear with me: In the MT variance analyses, did MT price out doing something with the RO reject stream brine, and, if so, what disposal options did they price out?

David Pfeifer

Water Quality Standards

USEPA Region 5

312-353-9024